

Title: Scores on the Rise?!

Brief Overview:

These lessons will apply the use of TI-82 and statistics to summarize conclusions about the relationships between national and Virginia SAT scores and between the math and verbal SAT scores for the nation.

Link to Standards:

- **Problem Solving** Students will demonstrate their ability to interpret, analyze, and make conclusions from the graphs and data.
- **Reasoning** Students will compare Virginia SAT scores to the National SAT scores.
- **Number Relationships** Students will observe relationship between the Virginia SAT score and the national SAT score over the twenty-year period. They also will examine possible changes in math scores following the introduction of graphing calculators in 1994.
- **Statistics** Students will compute mean, median, mode using the TI-82. Students will use the TI-82 to construct box and whiskers plots, histograms, scatter plots, and stem and leaf plots.

Grade/Level:

Grades 9-12

Duration/Length:

This activity will take 2 days. The activities may take longer than anticipated depending on class duration and student's prior knowledge.

Prerequisite Knowledge:

Students should have working knowledge of the following:

- Mean, median, and mode
- TI-82 graphing calculator
- Construction of histograms, box and whisker plots, and scatter plots

Objectives:

Students will:

- work cooperatively in groups.
- collect and organize data from resources.
- use the statistics menu on the TI-82
- evaluate a situation and give appropriate support for their answer.
- make conclusions from graphs related to the data

Materials/Resources/Printed Materials:

- Tables of Virginia and National SAT
- Pencils
- Paper
- Calculator - TI-82
- Student Worksheets -Activity 1 and 2
- Teacher Resources - graphing calculator view screen

Development/Procedures:

- Use the statistics menu on the graphing calculator to calculate the measures of central tendency (mean, median, mode) for Virginia and National SAT scores.
- Use the mean and median to draw a box and whiskers plot of Virginia and National SAT scores as it appears on your graphing calculator.
- Construct a histogram for verbal and math of Virginia and National SAT scores and verifying the drawing with the graphing calculator.

Evaluation:

- Write a report comparing and/or contrasting your analysis of Virginia SAT scores and the national scores with the report in the local paper. Be sure to include if what your paper says is true and justify your reasoning.

Extension/Follow Up:

1. Students will create their own portfolio containing a minimum of 30 pieces of data of their choice, organizing the data into a frequency distribution, computing at least two measures of central tendency and choosing at least two graphical representations appropriate for the data. Based on their analysis, they also will predict future trends and justify their reasoning.

2. Students will graph the national and Virginia SAT total scores. They will examine the trend of Virginia's SAT scores as compared to the national SAT scores for the last two decades. They will predict their SAT score and predict the average SAT score of Virginia for the next decade. They will research reasons for changes in the SAT scores.

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SAT SCORE AVERAGES, 1975 - 1995

College Bound Seniors

Source: From Home Runs to Housing Costs - Dale Seymour Publications

Year		Verbal	Math
1975		434	472
1976		431	472
1977		429	470
1978		429	468
1979		427	467
1980		424	466
1981		424	466
1982		426	467
1983		425	468
1984		426	471
1985		431	475
1986		431	475
1987		430	475
1988		428	476
1989		427	476
1990		424	476
1991		422	474
1992		423	476
1993		424	478
1994		423	479
1995		428	482

Virginia SAT Scores

Source: College Board- June'96

Year	Number	Verbal	Math
1975	34,564	431	463
1976	35,262	428	462
1977	36,170	426	461
1978	35,791	428	462
1979	36,241	426	461
1980	36,310	423	460
1981	37,432	424	461
1982	36,852	426	462
1983	35,442	427	463
1984	35,064	428	466
1985	35,750	435	473
1986	38,522	435	473
1987	42,125	434	473
1988	45,102	430	472
1989	42,213	430	472
1990	39,438	425	470
1991	39,835	424	466
1992	40,808	425	488
1993	40,540	425	469
1994	40,529	424	469
1995	41,987	428	468

Activity One

VA. SCORES

1. Enter the math scores in List 1 <Stat Edit>.
Enter the verbal scores in List 2 <Stat Edit>.
2. Copy the box and whisker plot for each list; sketch them below.
< 2nd Stat Plot 1 on L1 1>

Math	200	300	400	500	600	700	800
------	-----	-----	-----	-----	-----	-----	-----

Verbal	200	300	400	500	600	700	800
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Use <trace> to locate and record the following information:

math mean _____

median _____

mode _____

verbal mean _____

median _____

mode _____

3. Make a (Back to Back) Stem and Leaf Plot

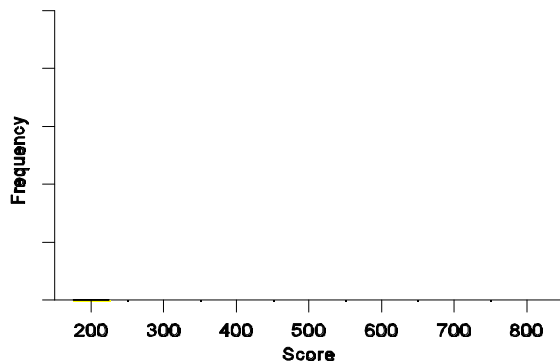
Math

Verbal

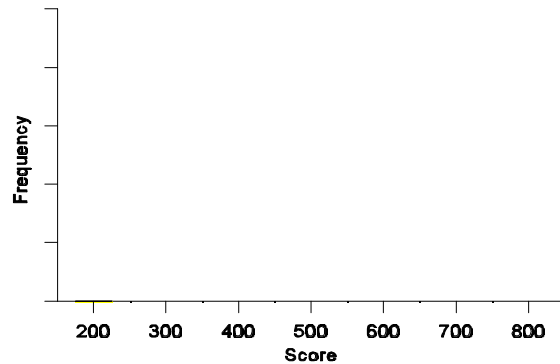
	2	
	3	
	4	
	5	
	6	
	7	
	8	

4. Sketch a histogram for each of the following.

Math



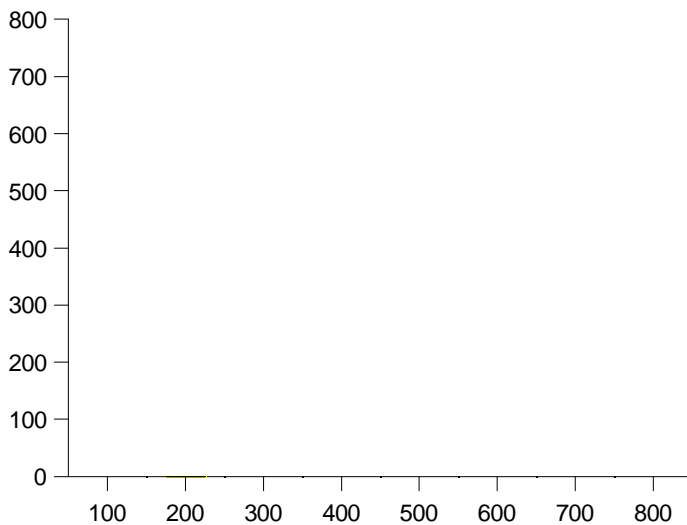
Verbal



5. Describe the relationship between the stem and leaf plots on #3 and the histograms on #4.

6. Input the data into the TI-82 to draw scatter plot:
2nd Stat Plot press enter to turn Plot 1 on
Select Type: scatter plot
X - List: Choose L_1
Y - List: Choose L_2
Press *Zoom 9* (*zoom stat*)

Draw the graph below.



Looking only at the graph is there a correlation ?
(positive, negative, or neither?)

7. Now what is the correlation (r) _____

< Stat Calc 5 L_1 , L_2 >.

Remember the closer r is to 1 the stronger the correlation.

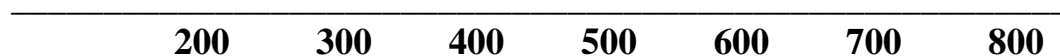
Which graph best illustrates the information and why?

Activity Two

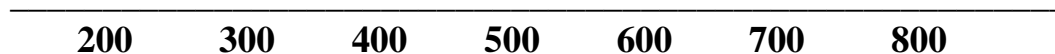
USA Scores

1. Enter the math scores in L_1 using <STAT> menu.
Enter the verbal scores in L_2 using <STAT> menu.
2. Make a box and whisker plot for each set of scores in L_1 and L_2 .

Math



Verbal



Record the following information for math and verbal scores.

Math

mean _____

median _____

mode _____

Verbal

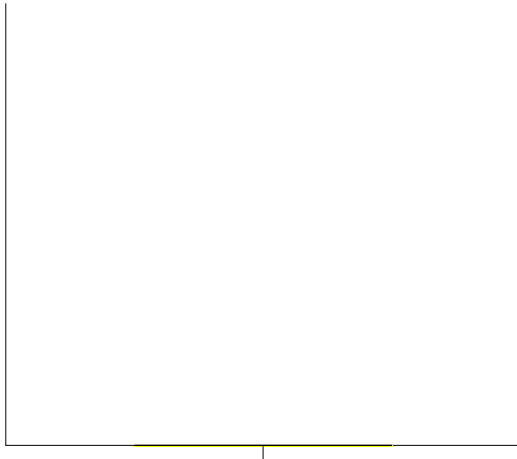
mean _____

median _____

mode _____

3. Sketch a histogram for each set of data.

MATH



VERBAL



4. Use the data to draw scatter plot:

2nd Stat Plot press enter to turn Plot 1 on

Select Type: scatter plot

X - List : Choose L_1

Y - List : Choose L_2

Press *Zoom 9* (*zoom stat*)

Draw the graph below

Verbal



Math

Based on the graph what is the correlation? (positive, negative or neither)_____

5. Using the calculator find the correlation(r)_____
- [State - Calc 5 : L_1, L_2]

Conclusion:

6. Compare both histograms (VA and USA). Are there any outstanding similarities or differences?_____
- _____
- _____